





IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 09/581,990  
Applicant : Yossi Bar-Erez  
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TC/A.U. : 1734  
Examiner : Cheryl N Hawkins

Docket No. : 1529/7

Commissioner of Patents and Trademarks  
Alexandria, Virginia 22313  
ATTENTION: Board of Patent Appeals and Interferences

**APPELLANT'S BRIEF**

Sir:

This is in furtherance of the Notice of Appeal filed in this case on September 2, 2004. The fees required under § 1.17(c) and any required petition for extension of time for filing this brief and fees therefor are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF. This brief is transmitted in triplicate.

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I. REAL PARTY IN INTEREST

The real party of interest in this application is the assignee of record Solidimension Ltd., having a place of business in Kibbutz Be'erot Izhak, Israel.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

The claims under appeal are claims 26-45, 51-52 and 55-56.

The status of the claims in this application is as follows:

- Claims 26-45, 51-52 and 55-56 are rejected.
- Claims 1-25, 46-50 and 53-54 are canceled.

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection mailed April 5, 2004.

V. SUMMARY OF INVENTION

The invention defined by independent **claim 26** under appeal is a method of making a three-dimensional object (*page 5, first paragraph of "Description of Preferred Embodiments", and Figure 3*) constituted of a large number of thin preformed sheets each bonded on one side to the next adjacent sheet on its opposite side (*page 5, first paragraph of "Description of Preferred Embodiments", and Figure 3*), with each sheet cut along a contour corresponding to the contour of the respective layer constituted by the sheet in the object (*page 5, first paragraph of "Description of Preferred Embodiments", and Figure 3*), the method comprising selectively applying to one side of each sheet a releasing agent effective to inhibit bonding between adjacent sheets (*page 9, first full paragraph*), the releasing agent being applied selectively in a manner such that, after the sheet has been bonded to the next adjacent sheet on that side, the surface of the sheet within the respective contour is bonded to the next adjacent sheet (*page 9, first full paragraph*), while the remaining portion of the respective sheet not within said contour is readily separable from the three-dimensional object (*page 11, the last sentence in the paragraph that bridges pages 10 and 11*).

The invention defined by independent **claim 36** under appeal is an apparatus for making a three-dimensional object (*page 5, first paragraph of "Description of Preferred Embodiments", and Figure 3*) constituted of a large number of thin preformed sheets each bonded on its opposite sides to the next adjacent sheets on its opposite sides (*page 5, first paragraph of "Description of Preferred Embodiments", and Figure 3*), with each sheet cut by a cutting tool along a contour corresponding to

the contour of the respective layer constituted by the sheet in the object (*page 5, first paragraph of "Description of Preferred Embodiments", and Figure 3*), characterized in that said apparatus includes a releasing-agent applicator for selectively applying a coating on one side of each sheet (*page 6, second full paragraph through page 7, second full paragraph, and page 11, third full paragraph, and Figures 1, 2, 4 and 5*), before being bonded to the next adjacent sheet on that side, of a releasing agent, said coating being selectively applied in a manner such that, after the respective sheet has been bonded to the next adjacent sheet on that side (*page 9, first full paragraph*), the surface of the sheet within its respective contour is bonded to said next adjacent sheet, while the remaining portion of the respective sheet not within said contour may be readily separated from the three-dimensional object (*page 11, the last sentence in the paragraph that bridges pages 10 and 11*).

## VI. ISSUES

The issues presented for review are as follows:

1. Whether claims 26-35, 51, 52 and 55 are unpatentable under 35 USC 103(a) over U.S. Patent No. 5730817, to Faygin et al. in view of U.S. Patent No. 6136132 to Kinzie.
2. Whether claims 36-45 and 56 are unpatentable under 35 USC 103(a) over U.S. Patent No. 5730817, to Faygin et al. in view of U.S. Patent No. 6136132 to Kinzie and U.S. Patent No. 4,721,453 to Belanger, Jr.

## **VII. ARGUMENTS**

### **REJECTIONS UNDER 35 U.S.C. 103**

#### **Rejection 1 -**

The Examiner has rejected claims 26-35, 51, 52 and 55 under § 103(a) as being unpatentable over U.S. Patent No. 5730817, to Faygin et al. in view of U.S. Patent No. 6136132 to Kinzie.

In the Office Action of 5 May, 2004, the Examiner stated the following as the basis for the rejection of claims 26. "Feygin et al. discloses a method of making a three-dimensional object (Figure 2) constituted of a plurality of thin preformed sheets (Figure 1, layers 56) each bonded on one side to the next adjacent sheet on its opposite side, with each sheet cut along a contour (Figure 2, contour line) corresponding to the contour of the respective layer constituted by the sheet in the object, the method comprising bonding one side of a sheet to the opposite side of an adjacent sheet such that the remaining portion of the sheet not within the contour is readily separable from the three dimensional object (Figure 2, cross hatching 82; column 5, lines 55-67; column 6, lines 1-2). Feygin et al. does not disclose the selective deployment of a releasing agent on one side of the sheet. One of ordinary skill in the art at the time of the invention would recognize the advantage of preventing the waste material from undesirably adhering to the sheets forming the three- dimensional object. Kinzie discloses a method of making a three-dimensional object in which a release coating is applied to prevent undesired adhesion (column 12, lines 4-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Feygin et al. to include selectively coating the top side of each sheet with a release agent as disclosed by Kinzie to prevent undesired

adhesion of the portion of the sheet comprising waste material to the portion of the sheet comprising a layer of the three-dimensional object.” (emphasis added)

The Examiner’s rejections seem to be based upon the following line of reasoning:

- As stated in the Response of Arguments in the Office Action mailed 5 May 2004, the Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art.
- The Examiner maintains that one of ordinary skill in the art at the time of the invention would recognize the advantage of preventing the waste material from undesirably adhering to the sheets being bonded to form the three-dimensional object.
- The reference a Kinzie discloses a method of making a three-dimensional in which a release coating is applied to prevent undesired adhesion.
- Modifying the method of Feygin to include the step of selectively coating the top side of each sheet with a release agent as disclosed by Kinzie is within the capabilities of one ordinarily skilled in the art, and does not render the invention non-obvious.

The Appellant’s counter-arguments are presented below.



**Argument:** The modification renders prior invention unsatisfactory for intended purpose, there is no reasonable expectation of success, and impermissible hindsight vision is afforded by the claimed invention.

The MPEP in Section 706.02(j) sets out the criteria for 35 USC § 103(a) rejection. Specifically, the MPEP states:

**To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure.**

With regard to the requirement of "Suggestion or Motivation To Modify the References", section 2143.01 of the MPEP states as follows: If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

The Appellant asserts that Feygin et al. does not in any way hint or suggest that selective non-adhesion would be advantageous. With regard to the adhesive, Feygin et al. simply states that: "The layers are bonded to each other with heat sensitive adhesives provided on one side thereof" (abstract), implying uniform adhesion over the entire area. Indeed, Feygin has no need for selective bonding techniques, since he teaches an alternative technique for facilitating detachment of residue material, namely, cross-hatching: "...cross-hatching 82 is cut in the sheet 56 so the resulting three-dimensional object will have a volume of loosely bound

*material around its exterior created by layers of cross-hatched material. The loosely bound material can then be knocked or scraped off...*" (col. 5, lines 62-66; emphasis added). Since Feygin et al. explicitly teaches a technique for facilitating detachment of waste material, one ordinarily skilled in the art would have no motivation to seek an alternative solution as suggested by the Examiner.

Certainly, there would be no motivation to seek an alternative solution in Kinzie, as suggested by the Examiner. The Kinzie reference relates to cutting of a solid block into two parts, processing the exposed surfaces, and re-bonding the two parts. Since Kinzie works throughout with a block of source material and a block of bonded slices, the bonding Kinzie refers to is the attachment of thick, rigid elements. As a result, the design considerations for attachment techniques are markedly different from those of thin-sheet stack construction such as disclosed by Feygin et al. This is clearly exemplified by the reference in Kinzie to the option of bonding by use of "*pins, bolts or screws*" (col. 12 lines 15-16). As a result, the Appellant respectfully submits that one ordinarily skilled in the art attempting to implement a thin-sheet model building system according to the teachings of Feygin et al. would not look to Kinzie for teachings of suitable bonding techniques.

The combination suggested by the Examiner would lead to highly undesirable results. Any application of a releasing agent to prevent adhesion around the object would disrupt the binding between adjacent layers of the cross-hatched residue material around the object, thereby freeing tiny particles of confetti-like cross-hatched sheet material which could jam the machinery or interfere with the cutting ability of the laser. Therefore, the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose.

The lack of motivation is particularly evident with regard to the combination suggested by the Examiner. Kinzie states that "...In some cases, it maybe appropriate to apply a bond inhibitor, such as a protective layer or a release agent and simultaneously of subsequently apply a general coating of a volatile solvent, closely coordinated with the lamination-press step..." From this statement, the Examiner asserts that "*It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Feygin et al. to include selectively coating the top side of each sheet with a releasing agent as disclosed by Kinzie to prevent undesired adhesion of the portion of the comprising waste material to the portion of the sheet comprising a layer of the three-dimensional object.*" (emphasis added)

The Appellant asserts that when Faygin et al. and Kinzie are each considered as a whole they lack any suggestion of the desirability of selectively coating the top side of each sheet of Feygin et al. with a releasing agent as disclosed by Kinzie, since Feygin et al. does not need a releasing agent and Kinzie deals only with blocks of material rather than the sheets of Feygin et al. Therefore, the prior art citations lack the obviousness of making the combination. In Section 2141 35 U.S.C. 103; The Graham Factual Inquiries, Basic Considerations Which Apply To Obviousness Rejections, the MPEP states as follows: When applying 35 U.S.C. 103, the following tenets of patent law must be adhered to: (A) The claimed invention must be considered as a whole; (B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; (C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and (D) Reasonable expectation of success is the standard with which obviousness is determined. Hodosh v. Block Drug Co., Inc., 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

The Appellant asserts that such obviousness is found only when Feygin et al. and Kinzie are viewed with hindsight afforded by the present invention. That is, only when presented with the step of selectively applying a releasing agent as disclosed by the present invention would the Examiner look to Kinzie for prior art disclosing the use of a releasing agent to combine with Feygin who teaches sheet construction of the three-dimensional model. However, when applying 35 U.S.C. 103, the references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention, as quoted above in sub-paragraph (C).

Furthermore, the Appellant asserts that the combination suggested by the Examiner lacks a reasonable expectation of success. As quoted in sub-paragraph (D) above: "Reasonable expectation of success is the standard with which obviousness is determined". In the Appellant's opinion, the highly undesirable results of such a combination, that is the freeing of tiny particles of confetti-like cross-hatched sheet material which could jam the machinery or interfere with the cutting ability of the laser, as discussed above, would be seen by one of ordinary skill in the art as disadvantageous to the degree that there would be no reasonable expectation of success in the modification of Feygin et al. with the releasing agent of Kinzie. Alternately, the use of Kinzie's "general coating of a volatile solvent" would also prove counter productive in relation to the "cross-hatching" of Feygin in that the solvent might flow into the open spaces created by the cross-hatching cut lines, thereby causing undesired bonding between the cross hatched sheet material. Such a general application could also cause smelling of the cross-hatched pieces. Any upward smelling would disrupted the planarity of the top surface and cause serious interference with the deployment of subsequent sheets during the model building process. Further, it should be noted that Kinzie's volatile solvent would clearly be

dismissed by one ordinarily skilled in the art as unsuitable for combination with the laser-cutting system of Feygin et al. which would be likely to ignite the solvent. Therefore, any reasonable expectation of success seen by the Examiner is afforded only with the benefit of impermissible hindsight vision afforded by the claimed invention.

The aforementioned MPEP section 2143.01 clearly indicates that the first criterion of "motivation to combine" is lacking in such a situation. Further, the aforementioned MPEP section 2143 clearly indicates that there is "no reasonable expectation of success" in such a combination, and that any "motivation to combine" or "reasonable expectation of success" seen by the Examiner is only with the benefit of impermissible hindsight vision afforded by the claimed invention. The Appellant therefore believes that the § 103(a) rejection is clearly improper and respectfully requests that this rejection be overturned by the Board of Patent Appeals and Interferences.

**Rejection 2 -**

The Examiner has rejected claims 36-45 and 56 under § 103(a) as being unpatentable over U.S. Patent No. 5730817, to Faygin et al. in view of U.S. Patent No. 6136132 to Kinzie and U.S. Patent No. 4,721,453 to Belanger, Jr. Most or all of the arguments stated in section VII A above apply equally to claims 36-45 and 56 with regard to the combination of Feygin and Kinzie, as claims 36-45 and 56 are apparatus claims that parallel the method of claims 26-35, 51, 52 and 55.

The Examiner has also cited Belanger, Jr. in combination with Feygin. Belanger, Jr. teaches the use of, *"A release agent dispenser may be included in the apparatus to apply release agent either prior to or subsequent to forming of the mold*

*and will serve to facilitate removal of the solidified premold later"* (col. 2, lines 15-18; emphasis added). Belanger, Jr. (US 4,721,543) is clearly teaching a method in which no permanent bonding is desired between the two elements and therefore the releasing agent is applied over the entirety of an area. The Applicant respectfully submits that the context in which Belanger, Jr. teaches the use of a releasing agent is so removed from the problem solved by the present invention that one familiar with Feygin would not be expected to turn Belanger, Jr. for a solution to the issue of joining two layers, specific portions of which are permanently bonded together while other portions are not bonded at all. Further, the applicator (sprayer 36) of Belanger, Jr. is unsuited for use in combination with Feygin such that one of ordinary skill in the art would not be expected to modify the apparatus of Feygin to include the applicator of Belanger, Jr.

The Appellant, therefore, submits that the § 103(a) rejections are improper and respectfully requests that these rejections be overturned by the Board of Patent Appeals and Interferences

Respectfully submitted,

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Date: December 28, 2004

VIII. APPENDIX - COPY OF CLAIMS UNDER APPEAL

26. A method of making a three-dimensional object constituted of a large number of thin preformed sheets each bonded on one side to the next adjacent sheet on its opposite side, with each sheet cut along a contour corresponding to the contour of the respective layer constituted by the sheet in the object, the method comprising selectively applying to one side of each sheet a releasing agent effective to inhibit bonding between adjacent sheets, the releasing agent being applied selectively in a manner such that, after the sheet has been bonded to the next adjacent sheet on that side, the surface of the sheet within the respective contour is bonded to the next adjacent sheet, while the remaining portion of the respective sheet not within said contour is readily separable from the three-dimensional object.

27. The method according to Claim 26, wherein the side of each sheet opposite to that coated with said releasing agent is covered on its complete surface with an adhesive to promote the bonding of all said sheets to each other except where covered by said releasing agent.

28. The method according to Claim 27, wherein said adhesive is applied to the under surfaces of said sheets, and said releasing agent is applied to the upper surfaces of said sheets.

29. The method according to Claim 27, wherein said sheets are individually fed to and stacked on a horizontal table which is successively lowered as the sheets are successively stacked thereon.

30. The method according to Claim 29, wherein each individual sheet is coated on its upper surface outside of its respective contour with said releasing agent as the sheet is fed to said horizontal table to be stacked on top of the other sheets thereon.

31. The method according to Claim 30, wherein each individual sheet is coated on its upper surface with said releasing agent by a releasing-agent applicator controlled to apply the releasing agent outside of the contour of the respective sheet while the sheet is moving.

32. The method according to Claim 30, wherein each individual sheet is coated on its upper surface with said releasing agent by a moving releasing-agent applicator controlled to apply the releasing agent outside of the contour of the respective sheet while the sheet is stationary.

33. The method according to Claim 31, wherein each individual sheet is cut along its respective contour by a cutting tool which is driven in two dimensions to trace the respective contour while the sheet is stationary.

34. The method according to Claim 29, wherein each individual sheet is coated on its complete lower surface with said adhesive as the sheet is fed to said horizontal table to be stacked on top of the other sheets thereon.

35. The method according to Claim 30, wherein each sheet is precoated on at least one of its surfaces with said adhesive.



36. Apparatus for making a three-dimensional object constituted of a large number of thin preformed sheets each bonded on its opposite sides to the next adjacent sheets on its opposite sides, with each sheet cut by a cutting tool along a contour corresponding to the contour of the respective layer constituted by the sheet in the object, characterized in that said apparatus includes a releasing-agent applicator for selectively applying a coating on one side of each sheet, before being bonded to the next adjacent sheet on that side, of a releasing agent, said coating being selectively applied in a manner such that, after the respective sheet has been bonded to the next adjacent sheet on that side, the surface of the sheet within its respective contour is bonded to said next adjacent sheet, while the remaining portion of the respective sheet not within said contour may be readily separated from the three-dimensional object.

37. The apparatus according to Claim 36, wherein said releasing-agent applicator is located to apply said releasing agent to the upper surfaces of said sheets.

38. The apparatus according to Claim 37, wherein said apparatus further includes: a horizontal table; a feeder for feeding said sheets individually to, and stacking them on, said horizontal table; and a drive for lowering said table as said sheets are successively stacked thereon.

39. The apparatus according to Claim 38, wherein said drive comprises a rotary motor and screws driven by said motor and coupled to the corners of said horizontal table for raising and lowering the table.

40. The apparatus according to Claim 38, wherein said releasing-agent applicator is located to apply said releasing agent to the upper surface of each sheet as it is fed to said horizontal table to be stacked on top of the other sheets on the table.

41. The apparatus according to Claim 40, wherein said releasing-agent applicator is controlled to apply said releasing agent outside of the contour of the respective sheet while the sheet is moving.

42. The apparatus according to Claim 40, wherein said releasing-agent applicator is movable and is driven to apply the releasing agent outside of the contours of the respective sheet while the sheet is stationary.

43. The apparatus according to Claim 40, wherein said cutting tool is driven in two dimensions to trace the respective contour of the sheet while the sheet is stationary.

44. The apparatus according to Claim 40, wherein said releasing-agent applicator and said cutting tool are carried by a common head which is driven in two dimensions to define the contour of the respective sheet.

45. The apparatus according to Claim 40, wherein said apparatus further includes an adhesive applicator for applying an adhesive coating to the under surface of each sheet as it is fed to said horizontal table, to effect the bonding thereof to the underlying sheet at the portions of the underlying sheet not covered by the releasing agent.

51. The method according to claim 26, wherein said selective deployment of said releasing agent is effected by selective application of said releasing agent.

52. The method according to claim 26, wherein said selective deployment of said releasing agent is effected by selective removal by a coating of said releasing agent.

55. The method according to claim 26, wherein said releasing agent is applied on at least one of said sheets over a major portion of the surface of the sheet not included within the respective contour.

56. The apparatus according to claim 36, wherein said releasing agent applicator is configured to apply said releasing agent coating on at least one of said sheets over a majority of the part of the sheet not included within the respective contour.

IX. APPENDIX OF EVIDENCE

NONE

X. APPENDIX OF RELATED PROCEEDINGS

NONE